



PROCESS EQUIPMENT DESIGN

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PRE-REQUISITES : Basic knowledge of Heat Transfer and Mass transfer

INTENDED AUDIENCE : Undergraduate students of Chemical Engineering. However, this course will also be helpful for those who have substantial industrial experience while working in chemical processes and designing process equipment.

INDUSTRIES APPLICABLE TO : Any chemical process plant

COURSE OUTLINE :

Chemical process plants include a number of important equipment such as reactors, distillation columns, absorbers, heat exchangers, evaporators, crystallizers, etc. Design of such equipment should be carried out a priori to set-up a process plant and thus, it is the basic step in a chemical process. The present course enables one to learn about the complete process design of Heat Exchanger, Condenser, Reboiler, Crystallizer, Evaporator, Packed column and Distillation column. Further, mechanical design of distillation column is also illustrated in this course.

ABOUT INSTRUCTOR :

Prof. Shabina Khanam is working as Associate Professor in Chemical Engineering Department of IIT Roorkee. She has completed B.Tech degree from AMU Aligarh, Aligarh in 2000 and M.Tech and Ph.D. degree from IIT Roorkee in 2002 and 2007, respectively. Her major fields of study are Process Integration, Energy Management and Modeling and Simulation. She has almost 9 years of experience in teaching and research. During this period she has supervised 1 Ph.D. and 14 M.Tech theses. At present 6 Ph.D and 3 M.Tech theses are in pipe line. She has published 29 and 24 research papers in different refereed journals and conferences, respectively. She has taught the course Mechanical Operations six times in her 9 years of teaching career.

COURSE PLAN :

- Week 1:** Introduction
Classification of exchangers-1
Classification of exchangers-2
Basic design parameters-1
Basic design parameters-2
- Week 2:** Double pipe exchanger-1
Double pipe exchanger-2
Double pipe exchanger-3
Types of Shell and Tube exchangers (S&TE)
Tubes and Shell-1
- Week 3 :** Tubes and Shell-2
S&TE design-Kern's method-1
S&TE design-Kern's method-2
S&TE design-Kern's method-3
S&TE design-Kern's method-4

- Week 4 :** S&TE design-Kern's method-5
S&TE design-Bell's method-1
S&TE design-Bell's method-2
S&TE design-Bell's method-3
S&TE design-Bell's method-4
- Week 5 :** S&TE design-Bell's method-5
Condenser design-1
Condenser design-2
Condenser design-3
Condenser design-4
- Week 6 :** Condenser design-5
Reboiler design-1
Reboiler design-2
Reboiler design-3
Reboiler design-4
- Week 7 :** Reboiler design-5
Reboiler design-6
Reboiler design-7
Evaporator design-1
Evaporator design-2
- Week 8 :** Evaporator design-3
Evaporator design-4
Evaporator design-5
Crystallizer design-1
Crystallizer design-2
- Week 9 :** Crystallizer design-3
Crystallizer design-4
Packed column design-1
Packed column design-2
Packed column design-3
- Week 10 :** Packed column design-4
Distillation column (process design)-1
Distillation column (process design)-2
Distillation column (process design)-3
Distillation column (process design)-4
- Week 11 :** Distillation column (process design)-5
Distillation column (process design)-6
Distillation column (process design)-7
Distillation column (mechanical design)-1
Distillation column (mechanical design)-2
- Week 12 :** Distillation column (mechanical design)-3
Distillation column (mechanical design)-4
Distillation column (mechanical design)-5
Distillation column (mechanical design)-6
Distillation column (mechanical design)-7